

**Date and Time:** M,W,F: 10.10-11

**Classroom:** TBD

**Instructor:** Nikolaos Voulgarakis

**Office:** Neill 325

**Office Hours:** TBD or by appointment

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**Prerequisites:** None

**Course Outline:**

1. **Review of Probability**
2. **Introduction to Stochastic Processes**
3. **Markov Processes**
4. **Ito Calculus and Stochastic Differential Equations**
5. **Master Equation**
6. **Fokker-Planck Equation**
7. **Langevin Equation**
8. **The Mean First Passage time and Exit Time Problems**
9. **Review of Applications** (stochastic reaction-diffusion processes, population, growth, and search dynamics, Black-Scholes model)

**Recommended textbooks:**

- M. Lefebvre, *Applied Stochastic Processes*
- B. Oksendal, *Stochastic Differential Equations*
- M. Scott, *Applied Stochastic Processes in science and engineering*
- C. W. Gardiner, *Handbook of Stochastic Methods*

**Grading:**

- Homework: 30%
- Midterm Test: 30% (take home)
- Final Test: 40% (take home)